

## PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference CCM014BWO	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/EP2004/003342	International filing date (day/month/year) 30.03.2004	Priority date (day/month/year) 04.04.2003
International Patent Classification (IPC) or national classification and IPC C25B9/20, H01M8/02, H01M8/24		
Applicant CASALE CHEMICALS S.A. et al.		

1. This report is the International preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

a.  *(sent to the applicant and to the International Bureau) a total of 1 sheets, as follows:*

sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

b.  *(sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).*

4. This report contains indications relating to the following items:

Box No. I Basis of the opinion  
 Box No. II Priority  
 Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  
 Box No. IV Lack of unity of invention  
 Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement  
 Box No. VI Certain documents cited  
 Box No. VII Certain defects in the international application  
 Box No. VIII Certain observations on the international application

Date of submission of the demand 21.10.2004	Date of completion of this report 09.06.2005
Name and mailing address of the International preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Fitzpatrick, J Telephone No. +49 89 2399-8570



# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
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## Box No. I. Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
  - This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
    - international search (under Rules 12.3 and 23.1(b))
    - publication of the international application (under Rule 12.4)
    - international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the elements\* of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

### Description, Pages

1-8 as originally filed

### Claims, Numbers

1-4 received on 09.02.2005 with letter of 04.02.2005

### Drawings, Sheets

1/3-3/3 as originally filed

- a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

- The amendments have resulted in the cancellation of:
  - the description, pages
  - the claims, Nos.
  - the drawings, sheets/figs
  - the sequence listing (specify):
  - any table(s) related to sequence listing (specify):
- This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
  - the description, pages
  - the claims, Nos.
  - the drawings, sheets/figs
  - the sequence listing (specify):
  - any table(s) related to sequence listing (specify):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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## Box No. II Priority

- This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
  - copy of the earlier application whose priority has been claimed (Rule 66.7(a)).
  - translation of the earlier application whose priority has been claimed (Rule 66.7(b)).
- This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rule 64.1). Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.
- Additional observations, if necessary:

see separate sheet

## Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

Novelty (N)	Yes: Claims	1-4
	No: Claims	
Inventive step (IS)	Yes: Claims	1-4
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-4
	No: Claims	

### 2. Citations and explanations (Rule 70.7):

see separate sheet

## Box No. VI Certain documents cited

- Certain published documents (Rule 70.10)  
and / or
- Non-written disclosures (Rule 70.9)

see separate sheet

## Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

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**Section I.3: Basis - Additional Observations**

New claim 1 is the combination of the subject matters of originally filed claims 1,2 and 6. Claims 2-4 correspond to original claims 3-5 respectively.

**Section II.3: Priority - Additional Observations**

The priority stemming from EP03007760.6 has been determined to be validly claimed.

**Section V.2: Citations and Explanations**

- D1: FR-A-2 410 059 (ELECTRICITE DE FRANCE) 22 June 1979 (1979-06-22)
- D2: US-A-5 919 344 (LYSFJORD ROGER MARENO ET AL) 6 July 1999 (1999-07-06)
- D3: US-A-5 833 821 (SCHMID OTTMAR ET AL) 10 November 1998 (1998-11-10)
- D4: US 2003/027031 A1 (HELMOLT RITTMAR VON ET AL) 6 February 2003 (2003-02-06)
- D5: US-A-5 429 643 (GROFF DONALD W ET AL) 4 July 1995 (1995-07-04)
- D6: EP-A-1 396 558 (PROTON ENERGY SYSTEMS INC) 10 March 2004 (2004-03-10)

With particular respect to the specific disclosures thereof referred to in the International Search Report, the above cited prior art documents are pertinent as follows:

- (i) Each of the joints 13 and inner sleeves 15 of figure 3 of document D1 serve to support both the diaphragm 10 and the electrode 11 of the filter press arrangement of an electrolyser. As such, both joint and sleeve serve as frame members. This is supported by claim 5 of D1 and by Fig.3 which makes it clear that sleeve 15 is a bulk structure and has a supporting role not only as mentioned above but also for the horizontally and vertically disposed channels passing through it. This is indeed directly analogous to the same channels features in frame member 8 of the current application. The sleeve is moreover positioned within joint 13. That they can also be annular and coaxial is apparent from Fig.3 in combination with the penultimate paragraph on page 5 of D1 as well as from claim 10. The joints can be made of fluorinated resin such as PTFE. There may additionally be a suggestion that the PTFE may be loaded with other material i.e. be a composite (see D1, page 5, line 11 "chargé").

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The subject matter of amended claim 1 is only in substance distinct from that of D1 via the fact that there is no clear indication that features 13 and 15 are made of different materials as the disclosure is silent with respect to the chemical nature of the sleeves 15. The fact however that both features are similarly depicted in Fig.3 of D1 suggests that both components may have the same chemical nature. Such a fluorinated resin composition would of course be logical in that it would provide the sleeves with the necessary chemical resistance to at least the strong alkali flowing in said channels. This distinction offers the current invention the advantage over the structure of D1 that the respective frame members 8 and 9 can be better optimised to their intended purposes, in particular, the composite nature of frame member 9 can be selected such as to primarily provide optimum resistance to the high working pressure of the reactor. As such, the overall frame structure can be made thinner for the same working pressure.

(ii) The rigid steel annular frame 1 of the electrolytic filter press assembly of document D2 holds diaphragm 12 via fastening means 4, which from Fig.1 is also in the form of a generally annular structure coaxially positioned inside frame 1 and which is secured to the frame by being integral with the flexible vulcanisable insulation and sealing material 6 covering frame 1. Each of the frames is associated with holes and passages 8 and 9 for fluid passage through the filter press. This disclosure is however not prejudicial as the frame 1 and fastening means 4 are not structurally independent. This feature in the current invention however ensures that the respective elements can be more simply produced and individually replaced, thus extending the working life of the reactor.

(iii) The membrane 4 of the filter press electrolyser of document D3 is held between annular frame 69 and annular membrane frame 66, the latter being coupled inside the former via intervening contact ring 60 and via conductive plates 16. At least the frame 69 which incorporates supply and discharge lines can be made of KOH-resistant plastic materials. The disclosure is however silent to the composition of member 6. There is no moreover no fair suggestion that frame members 69 or 66 could be made of composite material resistant to high pressure or that they should be made of different materials. The disclosure of D3 thus has the same drawbacks over the current invention as indicated with respect to document D1 above.

(iv) Figure 2 of document D4 shows frame and sealing material 20 used to support and

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seal membranes 110 and bipolar plates 115 in a filter press fuel cell arrangement. The material 20 has deformable inner regions 21 in order to absorb temperature-related stress and inelastic outer regions 22, the latter serving as a more rigid part of the frame. The material 20 can be a thermally stable plastic and can be reinforced with fibre additives or via crosslinking. As the inner and outer materials can not however be fairly considered as structurally independent, the current invention offers the same advantages over D4 as indicated with respect to document D2 above.

(v) Figs.2A and 2B of document D5 shows a bipolar lead acid battery having a filter press type of assembly comprising separate frame elements 32,34 and 36 supporting bipolar plates 40 and 46 and separators 58. The frame elements, which may be thermoplastic and glass-filled (see col.11, penultimate paragraph), are annular and are coupled coaxially one inside the other. As however there is no fair suggestion that the frame elements should necessarily be different in composition or per se resistant to high pressure (the battery rather incorporates vents for pressure release), the current invention offers the same advantages over D5 as indicated above with respect to document D1.

For the above reasons, the amended claims are considered to comply with the requirements of Arts.33 (2)-(4) PCT.

**Section VI: Certain documents cited**

Document D6 is a document according to Rule 33.1 (c) PCT. In view of the valid priority of the currently claimed subject matter, this document could only be available for novelty. Figure 5 of document D6 discloses a hydrogen flow field structure 84 including bipolar plate 92 supported in an annular frame member 86 which can be made of thermoplastic or thermosetting polymer and is resistant to the electrochemical environment. This frame is itself supported externally by metal ring 88 which thus also serves as a second annular frame member. The "composite" nature of annular frame 9 of amended claim 1 however assures novelty over this disclosure.

**Section VII: Certain Defects**

(i) In view of the above analysis of the prior art, the current "characterised in that" two part-form of claim 1 is inappropriate.

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(ii) The description has not been adapted to the amended claims.

## CLAIMS

1. Structural component for electrolytic cells of an electrochemical reactor of the filter-press type, comprising of a frame (6) supporting its corresponding functional element (7, 7a) chosen between a bipolar sheet and respectively a diaphragm, characterized in that said frame (6) comprises a first annular frame (8) and a second annular frame (9), the two being structurally independent of each other and coupled together, coaxially, one inside the other, said first annular frame (8) and said second annular frame (9) being made of different materials, the material of said first annular frame (8) being mainly resistant to corrosion by chemical agents, the material of said second annular frame (9) being made of composite material mainly resistant to the high working pressures of said reactor (1).
2. Structural component according to claim 1, wherein said first annular frame (8) has holes (10, 10a, 10b, 10c) and channels (12, 12a) adapted to provide, in a packed layout, passages for an operating fluid inside said electrochemical reactor.
3. Structural component according to claim 1, wherein said first annular frame (8) is made of thermoplastic or thermosetting polymer material.
- 25 4. Structural component according to claim 3, wherein said polymer material contains reinforcement fillers and/or additives.